

# **Guidelines for the Development of Best Management Practices for the Shipbuilding and Repair Industry**

**UNITED STATES NAVY  
David Taylor Research Center**

in cooperation with

**National Steel and Shipbuilding Company  
San Diego, California**

Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE <b>JUL 1992</b>		2. REPORT TYPE <b>N/A</b>		3. DATES COVERED <b>-</b>	
4. TITLE AND SUBTITLE <b>Guidelines for the Development of Best Management Practices for the Shipbuilding and Repair Industry</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Naval Surface Warfare Center CD Code 2230-Design Integration Tools Bldg 192, Room 128 9500 MacArthur Blvd, Bethesda, MD 20817-5700</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>SAR</b>	18. NUMBER OF PAGES <b>39</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

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**Guidelines for the Development of Best Management Practices  
for the  
Shipbuilding and Repair Industry**

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For:

National Shipbuilding Research Program (NSRP)  
Facilities and Environmental Effects Panel SP-1

July 1992

Task # N1-89-3

## **EXECUTIVE SUMMARY**

This report is a handbook/guide for the shipbuilding and ship repair industry to develop Best Management Practices (BMPs). Thus, the handbook may be useful for fulfilling various federal, state, and local environmental requirements.

Funding for this project was supplied by the National Shipbuilding Research Program (NSRP) who saw the need for shipyards to be proactive in the area of water quality and pollution prevention. The NSRP also promotes and supports projects that emphasize many other environmental issues.

This guide was prepared to supply generally acceptable BMPs that can be applied to shipyards throughout the nation. The BMPs are written in a generic nature to allow for various shipyard sizes and geographical locations. Specific BMPs need to be developed for individual shipyard permits based upon local requirements and circumstances. The BMPs supplied in this guide address water quality issues and suggest methods to minimize the potential for water pollution. In many cases, the BMPs supplied in this document overlap existing laws and regulations (i.e., Spill Prevention Control Countermeasure Plan).

The project was developed in conjunction with several shipyards nationwide through shipyard surveys, visits and SP-I Panel Meeting discussions.

The Best Management Practices (BMPs) developed by this project and published in this document are guidelines to assist in the control and prevention of potential water pollution in the shipyard environment. These recommendations or guidelines are intended to be interpreted and applied by environmental engineers and other qualified persons trained in this discipline. The BMPs are not developed for use as legal standards and the National Shipbuilding Research Program (NSRP) does not advocate their use as such. However, it is recommended that individuals and organizations use these recommendations and guidelines as a supplement to their environmental program. The NSRP does not oppose their use in this manner when the BMPs improve the shipyards overall environmental program. However, the user must recognize all constraints and limitations subject to proper BMP implementation and bear the responsibility for such use.

## **PROJECT SUMMARY AND ACKNOWLEDGEMENTS**

This “Final Report” is the result of an effort to develop Best Management Practices (BMPs) for the shipbuilding and repair industry. The National Shipbuilding Research Program (NSRP) saw a need for the shipbuilding industry to develop a BMP guidance document. The 28 BMPs developed by this project are mainly directed at water quality protection and are designed to complement RCRA, OSHA, Clean Air Act, and the SPCC Plan.

Research was conducted to determine current BMPs available and new BMP areas that needed to be addressed. Several shipyard surveys were performed to determine what types of BMPs were universally applicable in the industry. Surveys were conducted in conjunction with the NSRP, SP-1 Facilities and Environmental Effects Panel.

Mr. Zachary F. Jacobs, Project Engineer, and Mr. T. Michael Chee, Project Manager/ SP-1 Panel Chairman, both of National Steel and Shipbuilding Company (NASSCO), were responsible for project research, development, and presentation.

The NSRP and NASSCO would like to thank the members of the SP-1 Panel and others who participated in the surveys for their input on this project. We would also like to acknowledge the use of materials from the following sources in the preparation of this guidance document.

### **Selected Sources of Information:**

Environmental Protection Agency, NPDES, “Best Management Practices Guidance Document,” Office of Water Enforcement and Permits, NPDES Technical Support Branch, June 1981.

Environmental Protection Agency, “Document for Proposed Effluent Limitations Guidelines and Standards for the Shipbuilding and Repair Industry,” EPA/440/I -79/076b, Draft December 1979.

Commonwealth of Virginia, Draft “Best Management Practices Manual for the Shipbuilding and Repair industry,” Virginia Water Control Board, Prepared by Begston, Debell, Elkins & Titus, Ltd. Centreville, Virginia, June 1989.

Puget Sound Shipbuilders Association & Puget Sound Water Quality Authority, “Best Management Practices for Ship and Boatbuilding and Repair Yards,” Prepared By CH2M Hill Inc. Bellevue, WA. 1990.

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## **GENERAL YARD CLEANUP**

### **Objective**

Maintain a clean yard to provide an environment that reduces the potential for pollutants to enter groundwater or adjacent surface waters.

### **BMP:**

The yard is to be cleaned on a regular basis in order to minimize the loss of accumulated debris to adjacent waters.

Shipyards are to remove and properly dispose of all refuse, including but not limited to: paper, cans, bottles, wood, steel, and other fabrication and construction materials.

Procedures and practices should be established to ensure that adequate clean-up occurs.

Grit Blast media should be swept up and stored as soon as practicable after use. See BMP on grit blast)

Debris that accumulates along the facilities shoreline should be periodically cleaned-up and removed.

All waste shall be managed within the guidelines of RCRA and other federal, state, and local regulations.

**NOTE:** Methods used for general yard cleanup range from broom sweeping and hand pick-up to the use of heavy equipment, sweepers, and loaders.

## **DRYDOCK CLEANUP**

### **Objective**

Ensure that materials on the drydocks and building positions do not reach the surrounding surface waters. The best method to accomplish this is through frequent drydock cleanups.

### **BMP:**

BMP on General Yard Cleanup should be followed on drydocks and building positions.

Drydocks should be cleaned-up as necessary to remove all loose trash, paint cans, discarded construction materials, sediment, oil, solvents, plastic and other potential pollutants.

All waste shall be managed within the guidelines of applicable Federal, State, and local regulations.

Before flooding the drydock for docking and undocking, the dock should be cleaned to a broom-clean state, unless otherwise permitted.

## **SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN (SPCC PLAN)**

### **Objective:**

In the event of a hazardous or nonhazardous spill emergency, an on-site SPCC plan will greatly enhance the ability for adequate response, containment, and clean-up of the spill.

### **BMP:**

- The SPCC plan should establish procedures and other requirements to minimize the release of spills.
- The SPCC plan should be implemented and adhered to by all members of the shipyard, sub-contractors, and customers working on site.
- Areas of the shipyard that need to be addressed are spill reporting, spill clean-up, process tanks, portable tanks, material storage areas, employee training, reporting and record keeping, and many others.

## SHIPYARD EVALUATION AND RISK IDENTIFICATION

### Background:

There is risk for water pollution in shipyards because of their proximity to waterways. Shipyards use a variety of materials that could be transported to the water if an unforeseen event should occur. Unforeseen events can occur at any time or place in the shipyard, although many areas can be identified as being of high risk. High risk areas have either large volumes or highly toxic materials and ready access to a pathway leading to surface and/or ground waters. Risk potential is evaluated by application of best engineering judgement to the specifics of each potential source or pathway. Main considerations are volume of containers, location, estimated flow-rate should a spill occur, toxicity, and clean-up control and prevention procedures.

### Objective

Ensure that the shipyard departments are aware of their local surroundings with respect to environmental concerns (i.e., spill pathway leading to surface waters, ground waters, and local sewer).

### BMP:

- I Areas within the shipyard facility where potential environmental pollutants are stored, used and/or transported need evaluation with respect to discharge risk potential.

NOTE: Major pathways to surface waters are storm drains, utility trenches, runoff channels, unsealed manholes and others. An up-to-date storm drain and sewer plot plan is very helpful for this BMP.

## **"NO DUMPING"**

### **Objective:**

To educate employees about illegal dumping in the shipyard.

### **BMP:**

What is Dumping? For the purpose of this BMP, it means:

- No discarding of pollutants into the surface waters, storm drains, sinks and toilets, or on the grounds.  
Pollutants consist of: paints, solvents, adhesives, oils, detergents, general trash and debris, etc.

### **"NO DUMPING" INTO:**

- Surface Waters:** Shipyards are committed to preserving state waters and the local environment. Workers are asked to take part in the commitment to preserve the environment by not "Dumping."
- Storm Drains:** Storm drains usually lead to the surface waters. These drains are a potential source of pollution. Be aware of the storm drains and do not allow "Dumping."
- Sinks & Toilets:** Sinks and toilets usually discharge to the local sewage treatment plant. "Dumping" pollutants into the treatment plant is illegal. It slows the water treatment process and can cause sewage spills which pollute the state waters. Also many illegally "dumped" pollutants do not get treated and end up in the ocean. Do not "Dump" into sinks and toilets.
- Facility Grounds:** "Dumping" of pollutants on the grounds is unacceptable. All spills must be cleaned-up immediately. If the pollutants are not cleaned-up, wind and rain will eventually transport the pollutants to state waters. Liquids will soak into the soil which will also eventually reach surface waters. Do your part to put litter in trash cans and report and/or clean-up all spills.

Be Aware, regulatory agencies will fine individuals and companies for illegal dumping.

**NOTE:** All discharges to surface waters must be identified on the shipyards NPDES permits.

## **SUB-CONTRACTORS IN THE SHIPYARD**

### **Background:**

The nature of the shipbuilding and repair industry requires many outside sub-contractors to perform work at the shipyards facility. This can cause problems with respect to shipyard environmental compliance, since many sub-contractors do not have the resources to understand all of the environmental laws.

### **Objective**

To ensure that sub-contractors respect environmental and safety laws and regulations within the shipyard.

### **BMP:**

- Sub-contractors should be included in a safety and environmental orientation that should include some BMP education.
- Key sub-contractors that present the largest potential threat to the local water quality (i.e., painters, grit blasters, bilge cleaners, etc.) should be educated about specific BMPs and observed on the work-site as needed.

## POSTING SIGNS

### Objective:

Shipyard employees should be reminded about key BMPs. One effective method of shipyard education is that of posting signs in key areas and another is environmental newsletters.

### BMP:

- Signs may be posted at key locations to constantly remind employees about the BMPs in areas which have the greatest risk of pollution reaching surface waters.

### Examples:

Trash bins should have signs designating what type of materials are acceptable and unacceptable. For example, "No Chemicals," "Ferrous Metals Only," "Nonferrous Metals Only," "No Oily Rags or Other Hazardous Waste," etc.

Signs on or around storm drains. "No Dumping" crossed out sign with someone dumping into a storm drain; like the universal "No Smoking" sign.

Newsletters which highlight environmental concerns may be sent to employees or posted. For example, an Environmental Gram flyer is an excellent way to get the message out to the workers. Environmental grams should be written with shipyard employees in mind (i.e., they should be brief and to the point).

## **OIL CONTAINMENT BOOMS**

### **Background:**

Oil containment booms may be positioned around ships under repair while they are berthed at the shipyard. The booms are designed to contain spills that might occur during the ship's stay at the shipyard. When booms are placed around ships, it is easier to determine where a spill originated (i.e., from outside the boom or inside). Booms may also be kept on shore to deploy as ancillary containment if required in case a spill should occur.

### **Objective**

Ensure accidental spills that reach state waters are contained.

### **BMP:**

Shipyards may position oil containment booms around ships that present a possibility for improper discharges while berthed at the facility.

Reserve booming should be on site ready to deploy in case a spill requires additional containment.

- I Procedures should be developed for deploying additional oil containment booms around and for clean-up.

Procedures for clean-up inside the boomed area should also be developed.

The department responsible for deploying booms should be aware of outfall locations. These outfalls are potential locations where booms will need to be placed if a spill occurs near a storm drain.



## TEMPORARY AND PERMANENT LIQUID STORAGE AREAS

### Objective:

Provide an areawhere liquids can bestored thatwill help ensure spillage from containers such as paint cans, solvent drums, and oil drums does not soak into the underlying soils or enter nearby surface

should be stored in a place that can contain the material in the event of a spill. The contained area should be surrounded by a curb, dyke, berm or some other type of secondary containment to provide sufficient volume to help contain possible spills.

- I Storage of reactive, ignitable, or flammable materials will comply with all local and state fire codes.

NOTE: The following BMPs are designed to complement, not conflict with fire code requirements.

- I All paved storage areas should be free of cracks and gaps, and should be sufficiently impervious to contain leaks and spills until they can be addressed. Asphalt is not always adequate for use as a surface to contain fuels or other hydrocarbons.

Inside the contained area, the surface could be sloped towards a drain which is used to drain spills and rainwater. Some yards may choose to incorporate a blind sump in their containment area to recover spilled material.

- I The drains in storage areas could have positive controls. For example, a closed drainage valve or plug (with management practices/procedures for controlling spills). When practicable, storage areas should have sloped roofs to minimize the amount of rainwater buildup inside the contained area.

## **PERMANENT STORAGE TANKS**

### **Objective**

To provide proper permanent storage tank facilities for oils, paints, and other shipyard liquid materials in order to reduce the likelihood that accidental spills will reach surface waters.

### **BMP:**

#### **Above Ground Tanks:**

- I Permanently installed above ground tanks should be surrounded by a secondary containment system of sufficient volume to contain 100% of the largest tank or 10% of the total volume stored, whichever is the greater volume.

The ground surface in the bermed area should be a low permeability material (i.e., synthetic liners, concrete, bentonite liner, high clay content soil, or some other acceptable surface).

- I Rainwater trapped inside bermed areas need an acceptable method of disposal to be determined on a site-specific basis. Where practicable, roofs should be installed over storage areas to minimize rainwater buildup.

#### **Underground Storage Tanks:**

- I Regulations under 40 CFR 280 & 281 and/or appropriate state regulations as well as various EPA technical documents will be followed.

Records must be kept indicating the results of test performed for leak detection if the tanks fall under this requirement.

## MATERIAL TRANSFER AND MIXING AREAS

### Background:

In shipyards, liquid materials such as paint, thinner, oil, solvent, water, and cleaners are mixed and transferred from one container to another and may be accidentally spilled creating environmental hazards.

### Objective:

To provide secondary containment systems for transfer and mixing of liquids throughout the shipyard. Secondary containers catch accidental spills and leaks that could reach local surface and ground water.

### BMP:

- I Transfer or mixing of oils, paints, solvents and other shipyard liquid materials should be performed in a location that reduces the probability of spills reaching ground and surface waters. Drip pans, secondary containment pallets, and areas that are paved and bermed are examples of locations to perform liquid material transfer.
- I Departments that are responsible for liquid material transfer and/or mixing should prepare and follow procedures which describe how material is transferred safely. These departments should also prepare site specific spill control procedures.  
  
Secondary containment should be in place when making and breaking hose connections; especially areas with immediate access to storm drains, drainage trenches and other pathways leading to surface waters.
- I Drip pans should be temporarily used as containment when leaks are found. All leaks shall be repaired.

## BILGE AND BALLAST WATERS

### **Objective:**

Prevent discharge of oily bilge and contaminated ballast water to surface waters and provide an acceptable method for handling.

### **BMP:**

- I Oily bilge and ballast waters should not be discharged to surface waters.
- Discharge ports on the berthed ship should be connected to land-based collection system or an approved temporary holding vessel or tank.
- These waste waters must be disposed of properly (i.e., water treatment plant, oil/water separator, etc.) depending on local, state, and federal regulations.

- NOTE: Depending on the presence of oils, solvents, detergents, etc., direct discharge to sanitary sewer systems or to temporary holding tanks for off-site treatment (treatment and discharge requirements are site-specific) may be the most feasible method for disposal when approved by the local sanitation district.
- Arriving ships should be encouraged to empty their bilge and ballast water in accordance to federal and state laws and regulations prior to arrival at the repair facility.
  - Ballast tanks on the floating drydock that contact surface waters during docking procedures should be inspected and cleaned regularly.
  - Barges that are used to pump and contain bilge and ballast wastes shall comply with all Coast Guard rules and regulations.

## **SANITARY WASTE DISPOSAL**

### **Objective:**

To ensure proper disposal and handling of sanitary wastes.

### **Method:**

When vessels are placed in a wet slip, drydock or other docking facility for major or minor repairs, discharge of sanitary waste to surface waters is prohibited. Some means of transferring the waste water to a land-based sewage system must be available if systems are to be discharged.

### **BMP:**

- Hull fittings should be installed, if not already present, to permit the collection of sanitary waste.
- Procedures should be developed for hook-up and detachment of ship waste water systems.
- If a proper disposal system is not available, shipboard waste systems should not be used unless all waste can be contained in shipboard holding tanks and discharge outlets on the hull are plugged.
- The collection systems should be properly cleaned and stored when not in use. Tank cleaning effluent should be discharged to a sanitary sewer or transported off-site in accordance with environmental regulations.
- Where feasible, grey water wastes should be discharged to the sewer system or other approved disposal system.

## **MISCELLANEOUS DISCHARGES**

### **Objective**

There are numerous discharges which may occur in the shipyard environment. Individual discharges must be handled on a case-by-case basis. The main objective is to identify these possible discharges and determine proper methods for disposal.

### **BMP:**

Shipyards should perform inspections of their facility to determine all possible discharges into surface waters.

All point source discharges to the surface waters need to be identified in the shipyards NPDES permit.

Some examples of miscellaneous discharges that should be examined are as follows: boiler blowdown, condensate, metal fabrication chemical solutions, caustic wash water, pressure testing water, gate and wall leakage water in Graving docks, etc.

## **RECYCLING AND WASTE MINIMIZATION IN THE SHIPYARD**

### **Background:**

Recycling and waste minimization in the shipyard are essential for environmental compliance and preservation. A recent NSRP study has developed several ways in which the shipyard can implement waste reduction. In addition to the regulatory requirements, economic savings may result from an efficient waste minimization program. Minimizing waste also minimizes potential liability” and potential for pollution.

### **Objective:**

Minimize the waste generated and land filled by shipyards.

### **BMP:**

Waste minimization should be used as the basis for a program that will increase the shipyard workers awareness of environmental issues.

Shipyards should document reductions in waste production and materials substitution.

Recycling should be performed to the fullest extent possible (i.e., disposal to landfills should always be a last resort).

Shipyards should approach their waste minimization programs from the standpoint of environmental as well as economic impact.

## **BMP TRAINING PROGRAM**

### **Background:**

Employee education is the key to BMP success. Applicable employees must be educated in order to minimize the likelihood of pollution occurring. Education programs for selected hourly workers, officers, managers, and supervisors will ensure BMP responsibility and accountability as well as foster the development of solutions to potential environmental problems in the shipyard.

### **Objective:**

To educate shipyard employees and sub-contracted personnel concerning environmental requirements.

### **BMP:**

A Best Management Practices section could be added to the OSHA employee safety orientation class or a separate environmental training session could be given to newly hired personnel. The environmental training section may include the following:

Educate employees about shipyard pollutants and how those pollutants could reach surface waterways (i.e., storm drains, utility trenches, gutters, and sewer connections).

BMP procedures, responsibilities and accountability (i.e., sections of this BMP manual should be explained to all new employees).

Waste minimization in the shipyard.

Continued education is also extremely important in the shipyard. Employees need to be continually reminded about environmental concerns. One useful method is an environmental newsletter (i.e., Environmental Gram). The subjects in the environmental newsletters could be included in the training program.

Records should be maintained concerning employee environmental training and instruction.



## BMP COMMITTEE

### **Objective:**

The main objective of the BMP Committee is to have a definitive mechanism to identify and solve BMP problem areas. Shipyards may appoint a BMP coordinator to assist with in-yard compliance with their NPDES permit.

### **BMP:**

The BMP Committee could be composed of a representative from shipyard departments including; Legal, Environmental, Health and Safety, Production, Materials and/or others as deemed appropriate.

The BMP Committee may assist in implementing the BMP plan throughout the shipyard.

The BMP Committee should communicate on a regular basis to discuss BMP related incidents (i.e., spills, clean-up, compliance, etc.) in the shipyard and determine steps to prevent future occurrences.

The BMP Committee or designee should update the BMP plan as changes occur.

## **REPORTING BMP RELATED INCIDENTS**

### **Objective:**

To keep records of BMP related incidents, identify proper notification procedures and responsibility, and minimize the likelihood for future recurrence.

### **BMP:**

- Shipyards should produce and use a formal reporting procedure for documenting BMP related incidents. The BMP incident report should include: time, date, environmental problem, countermeasures taken, people and agencies notified, and recommended revisions to BMP plan if required.
- Governmental notification procedures should be defined which designate responsibility during all shifts.
- Shipyards should develop a communication system for reporting BMP related incidents at their facility in a timely manner (i.e., telephone, alarm, radio, etc.).
- Reporting procedures should minimize recurrences and expedite clean-up activities through effective communication.

## **MATERIALS COMPATIBILITY**

### **Objective:**

To minimize spills and accidents associated with materials incompatibility that can injure employees and pollute the environment.

### **BMP:**

Shipyards should identify areas where materials compatibility problems may exist and define procedures to prevent accidents.

Shipyards should base their evaluations on the following four factors:

- 1) Compatibility of container materials with the container contents
- 2) Compatibility of chemicals mixed within the container
- 3) Compatibility of the container with the environment
- 4) Compatibility of materials with adjacent stored materials (i.e., materials that are not compatible should not be stored next to one another)

The following steps should be taken in order to minimize the impact should a spill occur.

- 1) Shipyards may store potential problem chemicals in containers of 55 gallons or less when possible
- 2) Prepare a response system and spill control measures
- 3) If new procedures and processes are initiated, the BMP committee should be notified and the BMP should be changed accordingly.

## **HAZARDOUS MATERIALS TRACKING**

### **Background:**

Shipyards are required to report their material usage on an annual basis for several environmental reports (i.e., SARA Tier ). These material usage reports are helpful in determining high volume and high risk materials used at the facility.

### **Objective:**

Maintain hazardous materials inventory and usage control. Through hazardous materials control, the shipyard may more easily evaluate potential pollutant pathways.

### **BMP:**

A method for accurate hazardous materials managements should be developed. Methods for this will vary from shipyard to shipyard. The general layout for this BMP is implementation of controlled purchasing of haz-mats, distribution of haz-mats, and proper disposal.

One method for tracking hazardous material usage is with a computer tracking system. I NSRP has recently completed a project which developed a PC based Hazardous Materials Tracking System. (NSRP Report #034, available from the University of Michigan Library (UMTRI), Ann Arbor, Mi)

## HAZARDOUS MATERIALS AND WASTE TRANSPORTATION WITHIN THE SHIPYARD

### **Background:**

Shipyards transport hazardous materials and waste throughout their facility. Transportation equipment consists of forklifts, trailers, trucks, etc. In many cases, shipyards have a variety of rough terrain, therefore spills can occur if loads are not properly secured.

### **Objective:**

To minimize the likelihood of spills occurring during transportation and offer practices to control spills if they occur.

### **BMP:**

- Materials should not be transported unless they are properly prepared for transportation. This may include: properly secured lids, plugged bungs, proper labeling, and others.
- Material and waste can be secured to transportation pallets by using cellophane wrap, nylon strap/rope, walled containment pallets, or some other method that minimizes the potential that the load spills during transportation.
- Materials transported on pallets should be compatible with one another (see BMP on Materials Compatibility).
- Secondary containment pallets are useful when transporting hazardous materials and wastes.
- Material and waste pallets should be kept to manageable load size while being transported.
- Hazardous wastes transported must be labeled in accordance with local, state, and federal labeling requirements.
- Transportation employees should be aware of the risks associated with spilling hazardous materials and waste. They should also be very aware of spill notification procedures.

## THE DO'S AND DON'TS OF HAZARDOUS WASTE DISPOSAL

**Paint Waste**      Epoxy, water base, latex base, vinyl, oil base, paint and lacquer thinners, and TBT antifouling paints

**Don't:**      No discharging of this waste to sanitary sewer system, storm drains or to the facility grounds.

**Do:**      Segregate paint associated wastes (i.e., paint, solvents and thinners). This is usually performed by locating 55 gallon satellite storage containers in the painting areas. Solvents can be recycled by using a commercial solvent still for separation. All wastes developed must be disposed of within the guidelines of RCRA, DOT, and other regulatory agencies.

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**Waste Oils:** Hydraulic oil, gear oil, engine oil, lubricating grease, and other lubricating liquids

**Don't:**      It is illegal to pour oil onto the ground, into the sewer system, or into storm drains. Used oils shall not be used as dust suppressants, burned, or disposed of as general refuse. Do not mix degreasers, solvents, anti-freeze, or brake fluid with oil to be recycled.

**Do:**      Recycle used oils with an authorized recycler. Put the waste oil into a clean, sealed, labeled and approved container. Have a licensed transporter take the waste to the recycling facility.

.....

**Waste Brake Fluid:**      Brake fluid is used throughout the shipyard and is extremely toxic and needs proper disposal.

**Don't:**      Absolutely no disposal of brake fluid to the sanitary sewer system, storm drains, septic tanks, or the grounds.

**Do:**      Do dispose of brake fluid through a licensed waste management firm or TSDF.

## THE DO'S AND DON'TS OF HAZARDOUS WASTE DISPOSAL (cont.)

**Used Antifreeze** Antifreeze is also a very toxic chemical which needs special disposal procedures.

**Don't:** Do not pour antifreeze fluid into sewer, storm drains, or onto the ground (soils).

**Do:** Recycle antifreeze if the option is viable. Dispose of ant-freeze within the guidelines of RCRA.

....."

**Used Batteries:** There are a variety of batteries used in the shipyard.

**Don't:** Do not dispose of batteries into general refuse dumpsters or let them stack-up in storage.

**Do:** Collect and recycle all used batteries in the shipyard.

....."

**petroleum Waste:** Petroleum waste products consist of gasoline, diesel, kerosene, and cosmoline.

**Don't:** Do not discharge to storm drains, sewer system, or grounds.

**Do:** Petroleum waste must be recycled or otherwise disposed of through a licensed transporter or TSDF.

....."

**Degreaser Waste:** Degreasers consist of solvents, mineral spirits, paint thinners, etc.

**Don't:** Don't discharge to sanitary sewer, storm drains, or soils.

**Do:** Recycle to the greatest extent possible all degreasers and where possible switch from organic based solvents to inorganic, aqueous substitute detergents.

....."

**Tool Coolant:** May contain metal residues and may require treatment before disposal.

**Don't:** Do not mix coolant with other solvents, oils, or such. Do not dispose of in the sewer system, storm drains, or soils.

**Do:** Dispose of and recycle through the use of a waste management company. Investigate the use of recyclable fluids as well as aqueous substitutes.

## GRIT BLAST STORAGE AND DISPOSAL

### **Objective:**

To reduce the likelihood that grit materials are transported to surface or ground waters.

### **BMP:**

#### **Grit Blast Transportation and Storage:**

- Used grit blast material should be stored and transported in a manner which minimizes contact with process water and rainwater.

#### **Used Grit Blast Material Disposal:**

- Federal, state, and local rules and regulations must be followed when disposing and recycling of used grit blast material.



## CONTAINMENT OF GRIT MATERIAL AND PAINT OVERSPRAY

### **Background:**

Grit blasting and painting are performed extensively at shipyards. Blasting and painting occur at almost every location in the yard at one time or another. For example, blasting and painting occur in drydocks, building ways, assembly areas, and blast areas.

### **Objective**

To contain fugitive grit blast and paint overspray to the degree feasible with Best Management Practices.

### **BMP:**

- While performing blasting or painting in the shipyard where there is potential for fugitive material to enter surface water, shrouding systems should be used to minimize, to the greatest extent practicable, the accidental discharges of grit or paint into the surface waters.

**NOTE:** Ideas to keep in mind if you need to develop shrouding facilities and management practices:

- Dry abrasive blasting media is projected at high velocities that cause the material to become airborne. Therefore, wind speed and direction is a very important consideration for this BMP.

Many manufacturers make durable shrouding materials that can be used as a wind break or to catch fugitive blast media or paint overspray. Superstructures are often shrouded with this material when blasting or painting occurs while ships are at berth.

## OVER-WATER PROTECTION

### **Background:**

Ships at berth frequently need work to be performed on the off-shore side of the ship. Work is usually performed with the use of floats, lighters, pontoons, or working barges. These floats are used as a working platform and as a catch to prevent materials from entering surface waters.

### **Objective:**

To provide a surface to catch potential pollutants when work is performed on the off-shore side of berthed ships when there is potential for pollution.

### **BMP:**

Provide and position floats adjacent to ships when work is performed on the off-shore side of the ship. Work that has a potential for pollution may include: painting, paint chipping, grit blasting, welding, grinding, and sanding.

For blasting and painting operations on the hull, floats are to be used in conjunction with additional containment facilities to minimize the likelihood for paint overspray and/or blast particulate from entering surface waters. (See BMP on Grit Blast and Paint Containment)

Floats should be cleaned frequently to ensure that materials on the float do not get blown or washed into the receiving waters. (See BMP on Yard Clean-up)

Secondary containment should be used when there is a high potential for spills to occur on the float.

- When booms are in place, they should be routed around the floats. (See BMP on Booms)

## CATCH BASIN CONTROL AND CLEANING (IF APPLICABLE)

### **Objective:**

To minimize the amount of pollutants which can enter surface waters through accumulated waste build-up in storm drain catch basins.

### **BMP:**

- Shipyard storm water catch basins should be inspected periodically and cleaned as necessary.

**NOTE:** Methods used for clean-up could range from manual methods such as brooms and shovels to heavy equipment.

- All waste shall be managed within the guidelines of applicable federal, state, and local regulations.
- Storm drain catch basins can be controlled in a variety of ways. Drains can be modified to minimize the amount of floatable and sinkable waste from entering storm drain systems. Three methods are noted below:
  - 1) Asphalt curbing around basin with screened intake tubes and a cover.
  - 2) Bales of straw or some other type of filtering method placed around the catch basins. (Care should be taken when using hay or straw around hot work.)
  - 3) Grate screening and baskets

## PIPE TESTING AND FLUSH WATER

### **Background:**

Shipyards design, build, and repair piping systems on board ships. In many cases the systems need to be flushed and/or pressure (hydro) tested. Systems are flushed and tested with salt and fresh water. Some of the systems are cleaned or flushed with additives to the water as a test/flush media.

### **Objective:**

To ensure that flush and test waters are not discharged to surface waters unless they are approved discharges under their NPDES permit.

### **BMP:**

Flush and test waters that are not identified on the NPDES permit should not be allowed to be discharged into surface waters.

Methods and procedures should be developed defining how flush and test waters are recycled, treated, and/or disposed.

Test and flush waters discharged to the local POIW will need to be identified on the Industrial Wastewater (Sewer) Permit.

## WATER USE IN THE SHIPYARD

### Objective

Ensure that permitted discharges that enter surface waters do not come into contact with pollutants before they are discharged.

BMP:

#### Drydocked Vessels

- Vessels circulating non-contact cooling water into surface waters must secure watertight fittings for connecting the hoses. The fittings can be designed to be permanent or temporarily attached.

Cooling water will be directed to the surface water by way of flexible hoses to minimize contact with spent abrasive, paint, and other debris before entering surface waters.

Storm-water run-off enters the surface waters through storm drains and surface runoff. Storm water runoff areas should be kept clean to prevent storm-water from washing debris and other contaminants into the drains or directly into surface waters.

Gate leakage water in the Building Ways and Building docks should have minimum contact with any shipyard process materials (i.e., grit blast, paint, testing water, oil dirt, saw dust, etc.).

Non-contact cooling water on ships and for the facility are generally permitted to flow back into surface waters. Non-contact cooling water is surface water which is pumped into a system which needs cooling (i.e., compressors, generators, combustion engines, etc.). The water flows through cooling ports and does not become contaminated.

Shipyards are responsible for all discharges from their facility. Shipyard customers and sub-contractors are required to be aware of and follow all environmental regulations.

# THE NSRP NEEDS YOUR EVALUATION OF THIS REPORT<sup>W</sup>

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☐ Excellent   ☐ Good   ☐ Fair   ☐ Poor

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☐ Very Useful   ☐ Moderately Useful   ☐ N/A

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☐ Excellent   ☐ Good   ☐ Fair   ☐ Poor

• *Usefulness to You/Your Organization*

☐ Very Useful   ☐ Moderately Useful   ☐ N/A

• *Did AWI your organization implement the results of this project?*   ☐ Yes   ☐ No

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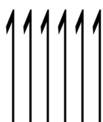
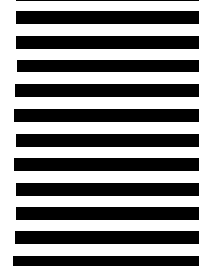
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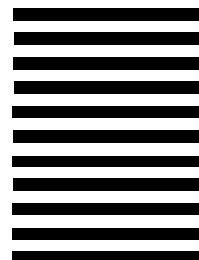
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